UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVIII. WASHINGTON CITY, MARCH, 1890. No. 3.

INTRODUCTION.

This REVIEW is based on reports for March, 1890, from 2,311 regular and voluntary observers. These reports are classified as follows: 171 reports from Signal Service stations; 121 reports from United States Army post surgeons; 7 reports of rainfall observations of the United States Geological Survey in New Mexico; 1,420 monthly reports from state weather service and voluntary observers; 23 reports from Canadian stations; 183 reports through the Central Pacific Railway Company; 386 marine reports through the co-operation of the Hydrographic Office, Navy Department; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, The Iowa Weather Crop Bulletin Service, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Missouri, Meteorological Report of the Missouri State Board of Agriculture, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, North and South Dakota, Ohio, Oregon, Pennsylvania, South Carolina, and Tennessee, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

CHARACTERISTICS OF THE WEATHER FOR MARCH, 1890.

The great flood in the lower Mississippi valley, which continued throughout the month, and the group of destructive tornadoes in Kentucky, southern Indiana, southern Illinois, and southeastern Missouri on the 27th, constituted the more remarkable features of the month. At most of the important points along the lower Mississippi river the water was the highest ever known, but the levees were in better condition than during great floods of preceding years, and many of the more important levees were firm and in good condition at the close of the month. On the 4th the water reached the danger line, 34.0 feet, at Memphis, Tenn. On the 11th the high water mark of 1874, 16.2 feet, was reached at New Orleans, La. On the 13th the water reached 17.0 feet on the gauge at New Orleans, La., the highest point ever reached at that place, but no material injury was reported. On this date the stage of the water was 36.5 feet at Memphis, Tenn.. this reading being 0.1 foot higher than ever before recorded at that point. On the 14th a gauge reading of 36.6 feet was noted at Memphis, Tenn. On the 27th the water at Arkansas City, Ark., was 2.2 feet above the high water mark of 1884. On the 9th crevasses occurred in the levees at Sappington Hook, Ark., and Alsatia, La.; on the 12th there was a break in the main levee at Alsatia, La.; on the 13th crevasses occurred at Nita Plantation and Plattenville, La., and Mayersville, Miss.; on the 14th crevasses occurred twelve miles below Donaldsonville, La., and at Bohemia, La.; on the 15th a crevasse occurred at Pecan Grove, La., this being the largest break reported for the month; on the 18th crevasses occurred at Offutt, Miss., and Luna, Ark.; on the 20th, at Jesuit Bend, La.; on the 25th, about one and one-half mile above Arkansas City, Ark.; on the 26th, at Skipwith, Miss., and Live Oak, La.; on the 27th, at Laconia, Ark.; on the 28th, at Columbia, Ark., Easton and Huntington, Miss.; on the 30th, at Austin, Miss.; and on the 31st at Greenville, Miss. Along the Ohio River and its tributaries flood conditions prevailed throughout the month, causing heavy losses and much suffering in low lying districts. At the close of the month the rivers were above the danger line from Cincinnati to the Gulf of Mexico, and the outlook in the lower Mississippi valley was discouraging.

The tornadoes of the 27th in Kentucky, southern Indiana, southern Illinois, and southeastern Missouri developed in the southeast quadrant of a low pressure storm which had advanced from the north Pacific coast southeastward to Colorado, and thence eastward over Kansas, Missouri, and Illinois, and within three hundred miles of the storm-centre. The most destructive of this group of tornadoes occurred in Kentucky, where upwards of one hundred lives were lost, and property to the value of about $4,000,000 was destroyed. In Louisville, alone, the loss of life was seventy-six, and many persons were injured, and the losses to property aggregated about $2,500,000. In Indiana the severest storms occurred in the extreme southern part of the state, where, at Jeffersonville, the Louisville tornado, which crossed the river at that point, demolished many buildings, without, however, an attendant loss of life. In Illinois seven lives are known to have been lost, many persons were injured, and the damage to property amounted to at least $200,000. In southeastern Missouri four lives were lost, while the reported damage to property is not heavy. In Tennessee severe wind storms caused the loss of several lives, and the damage to property was very great. Destructive wind and hail storms prevailed on this date from the Rocky Mountains eastward over the Ohio Valley and Lake region, but no lives were lost west of the Missouri River. Tornadoes were also reported at Excelsior, Ark., on the 11th, where a number of persons were injured and houses demolished; on the 22d, in Georgia, North Carolina, and South Carolina, where several persons were killed and much damage was done to buildings; and on the 21st a severe storm damaged crops at Howe, Tex.

The highest temperature reported was 105°, at Camp del Rio, Tex., on the 20th, and the lowest temperature noted was —40°, at Pokegama Falls, Minn., on the 5th. The month was warmer than the average March along the eastern slope of the Rocky Mountains, along the immediate Atlantic coast north of South Carolina, in New England, the Canadian Maritime Provinces, the Saint Lawrence Valley, the eastern part of the lower lake region, and in eastern Manitoba. In all other sections of the country the month was cooler than usual, and in

sections of the southeastern part of the country it was colder than any month during the past winter. The greatest departures above the average March temperature were noted in eastern Nova Scotia, where they exceeded 4°, and the most marked departures below the average temperature were reported in Illinois and in the British Possessions north of Montana, where they equalled or exceeded 5°. At stations in central Illinois and southeastern Iowa the mean temperature was as low or lower than previously reported for March. At stations in the Atlantic coast and west Gulf states, and over the southeastern slope of the Rocky Mountains the maximum temperature was as high or higher than reported for March of preceding years, and at stations in the south Atlantic states, the Florida Peninsula, the Gulf States, Tennessee, the upper Mississippi and Missouri valleys, the southeastern slope of the Rocky Mountains, the plateau regions, and along the north Pacific coast the minimum temperature was as low or lower than previously reported for March, and in the Atlantic coast states from New England southward, and in the Gulf States the minimum temperature was lower than at any time during the past winter. The cold waves which swept over the southern and southeastern states during the first and middle parts of the month, which were of unprecedented seasonal severity throughout a greater part of this area, were attended by heavy frost throughout the southern tier of states from Texas eastward to the Atlantic coast, which caused considerable damage to growing crops, fruit blooms, and young fruit trees, and light frost was reported as far south as Lee county, Fla., the extreme southern limit of frost ever reported for any month. On the 12th heavy frost injured fruit in the valley of the Gila River, Arizona. The killing frosts of the middle of the month were four to six weeks later in Florida, and one to two weeks later in the southern parts of the east Gulf states, while in the Carolinas the heavy frosts of the middle of the month, and in the Gulf States the killing frost of the first part of the month about corresponded with the average dates of last killing frosts in those regions.

The heaviest monthly precipitation reported was 19.83 inches at Sims, Shasta Co., Cal., and the precipitation exceeded fifteen inches in parts of Humboldt county, Cal., at South Fork, Ky., and Marengo, Ind. In the southwestern part of the southern plateau region, southeastern Arizona, southwestern and southeastern New Mexico, a greater part of southwestern Texas, within an area extending from the Panhandle of Texas northward over western Kansas, and in north-central Kansas no precipitation was reported. The precipitation was generally in excess of the average for the month from the west Gulf states northward over the upper Mississippi valley and northeastward over the Ohio Valley, the middle Atlantic states, and New England, over the northeastern slope of the Rocky Mountains, the middle and northern plateau regions, and along the middle and north Pacific coasts; elsewhere the precipitation was deficient. The greatest excesses in precipitation occurred in the northern plateau region, where more than double the usual amount of precipitation was reported, and in New England, the Ohio Valley, Tennessee, the middle plateau region, and the middle Pacific coast, where the precipitation was about 50 per cent. greater than the March average. In the Rio Grande Valley, and over the middle-eastern slope of the Rocky Mountains about one-eighth of the usual amount of precipitation fell; over the southeastern slope of the Rocky Mountains, and on the south Pacific coast about one-fourth; and in the south Atlantic and east Gulf states, and over the southern plateau region about one-half the usual precipitation for March was reported. At stations in New England, the middle Atlantic and west Gulf states, the Ohio Valley and Tennessee, Nebraska, Idaho, and Washington the precipitation was the heaviest, while at stations in Alabama, Kansas, Nebraska, Indian Territory, New Mexico, extreme western Texas, and south-central California the precipitation was the least ever reported for March. The heaviest snowfall of the month was reported along the line of the Central Pacific Railroad in Nevada and Placer counties, Cal., where it amounted to about one hundred and forty inches. The snowfall was heavier than for any month during the past winter in parts of the central Mississippi valley and lower Michigan, and on the 2d the heaviest snow storm since the establishment of the Signal Service station in 1871 occurred at Charleston, S. C.

Unusually brilliant and well-defined solar halos and parhelia were reported on the 2d in parts of New York, Mississippi, Louisiana, Arkansas, Alabama, Wisconsin, and North Dakota, and remarkable lunar halos were noted in Tennessee on the 2d and 3d. A long and protracted drought was reported in the lower Rio Grande valley. Many cattle were dying from thirst, early crops were retarded, and the Rio Grande River was at the lowest stage ever known at Brownsville, Tex.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for March, 1890, as determined from observations taken daily at 8 a. m. and 8. p. m. (75th meridian time), is shown on chart ii by isobars. The departure of the mean pressure for March, 1890, obtained from observations taken twice daily at the hours named from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Eastport, Me	+.003	Saint Paul, Minn	+.002
Boston, Mass	+.016	Cincinnati, Ohio	+.001
New York City	+.012	Memphis, Tenn	−.002
Philadelphia, Pa	+.013	Galveston, Tex	−.007
Washington City	+.013	Dodge City, Kans	−.015
Savannah, Ga	+.008	Santa Fé, N. Mex	−.015
Buffalo, N. Y	+.007	Denver, Colo	−.004
Detroit, Mich	+.007	Salt Lake City, Utah	−.013
Saint Louis, Mo	+.004	San Francisco, Cal	−.015
Chicago, Ill	+.005	San Diego, Cal	−.019

For March, 1890, the mean pressure was highest over northeastern Florida and the more southern part of the south Atlantic states, where it rose above 30.15, the highest mean reading, 30.16, being noted at Augusta, Ga., and at Jacksonville and Titusville, Fla. The mean pressure was above 30.10 from the east Gulf and south Atlantic coasts northwestward to Manitoba, and on the middle California coast. The mean pressure was lowest over the Canadian Maritime Provinces, where it fell below 29.90, and at Charlottetown, P. E. I., a mean reading of 29.84 was noted. Over a greater part of New England and the Saint Lawrence Valley, over the southwestern and extreme southeastern parts of the plateau region, on the extreme north Pacific coast, and from the British Possessions north of western Montana southeastward to central Colorado the mean values were below 30.00.

A comparison of the pressure chart for March, 1890, with that of the preceding month, shows that there has been a general increase of pressure from the upper lake region southward over the Ohio and Mississippi valleys, along the immediate Pacific coast, and from Oregon and northern California southeastward to northwestern New Mexico; elsewhere there has been a decrease in pressure. The increase in pressure in the districts named was generally less than .05, while in extreme eastern New England, Nova Scotia, and New Brunswick, and in north-central Montana and the British Possessions to the northward the decrease in pressure was more than .15. The area of high pressure which occupied the south Atlantic coast in February has contracted to the southward with slight changes in included values; the area of high pressure which extended northward and northwestward from the lower Mis-